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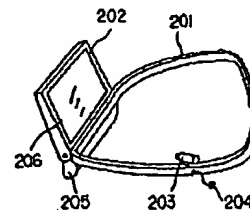
(54) PORTABLE TELEVISION TELEPHONE DEVICE

(57) Abstract

PURPOSE: To use the portable television telephone device with both the hands free without having the view interrupted by a main body by arranging an image display means on the upper half body of a user below the vision of the user.

CONSTITUTION: A support member 210 is a ring-shaped member which is formed of an elastic material such as plastic and partially parted, and this support member 201 supports a display 202 such as a liquid crystal display and a camera 203 so that their angles are variable. Further, the display 202 is supported on one side of the support member 201 and the camera 203 is supported on its one adjacent side while directed to the display 202. An image reflecting surface 206 is provided in front of the display 202, and a face image of the user is reflected on this image reflecting surface 206 and picked up by the camera 203.

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mimoza

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部
 319…マルチプレクサ
 プレイ
 321…D/A変換器
 部
 323…復号化部
 リ
 325…バッテリー切れ検知部
 ーデッキ部
 327…マイク
 カ
 100a, 100b…アンテナ
 ナ切替/合成回路
 102…復号化器
 器
 104…表示切替装置
 カ
 106…ディスプレイ
 108…マイク
 路
 111…第1の送受信アンテナ
 カ
 113…操作パネル
 材
 115…マイク
 117…表示パネル

320…ディス

322…後処理

324…バッテ

326…音声コ

328…スピー 10

101…アンテ

103…符号化

105…スピー

107…カメラ

109…制御回

112…スピー

114…支持部

116…カメラ

118…使用者

28

119…ケーブル

ナ

122…アンテナ

ネル

132…パネル

ネル

142…パネル

ネル

152…パネル

ネル

162…パネル

レビ電話装置本体

411…三脚

具

413…向き変更金具

具

415…アンテナ

421…固定装置

431…吸盤

20 板または壁

433…アンテナ

納部

441…引っ掛け金具

い部

442…壁

121…アンテ

131…操作バ

141…操作バ

151…操作バ

161…操作バ

410…携帯テ

412…取付金

414…固定金

420…格納部

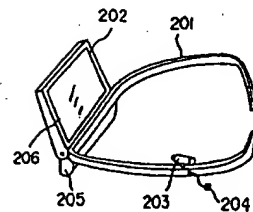
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432…ガラス

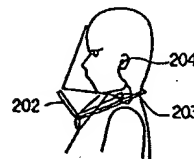
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442…かすが

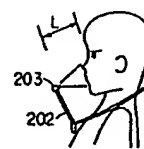
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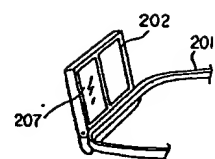
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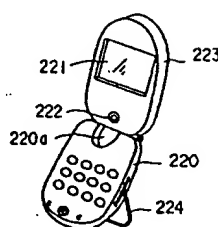
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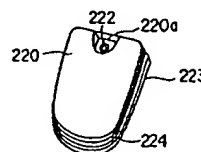
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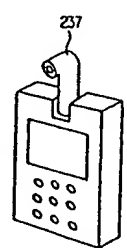
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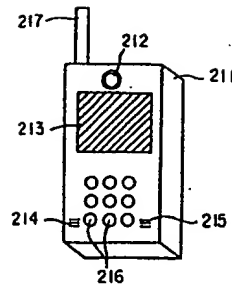
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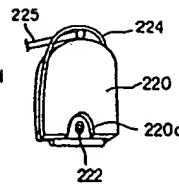
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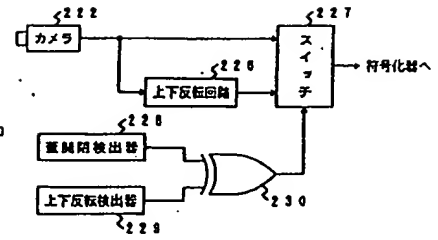
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【図10】



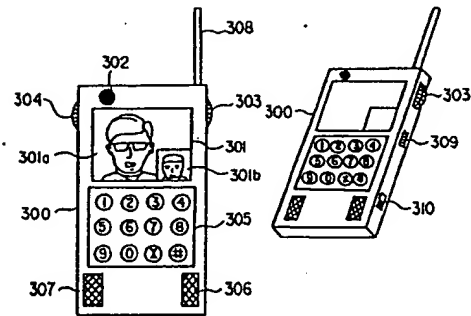
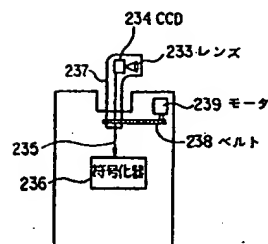
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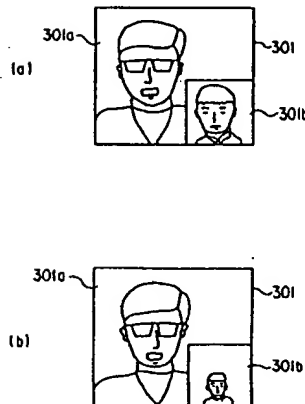
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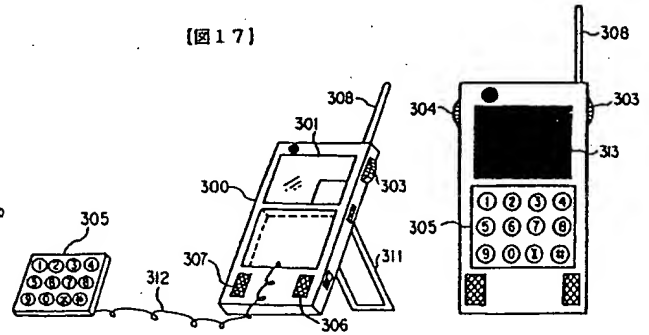


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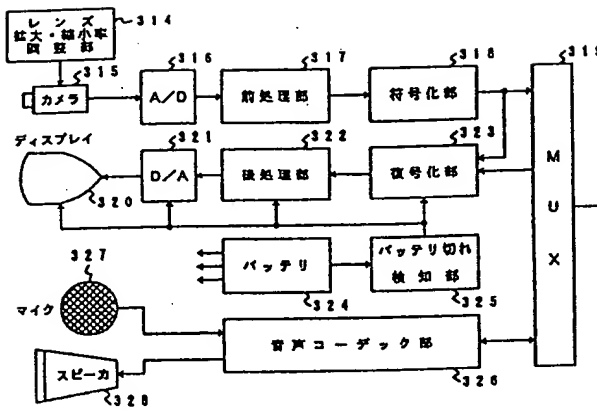
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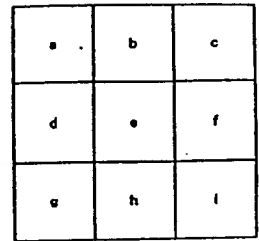
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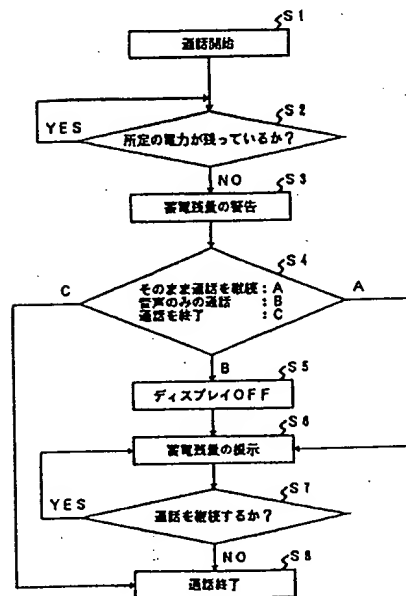
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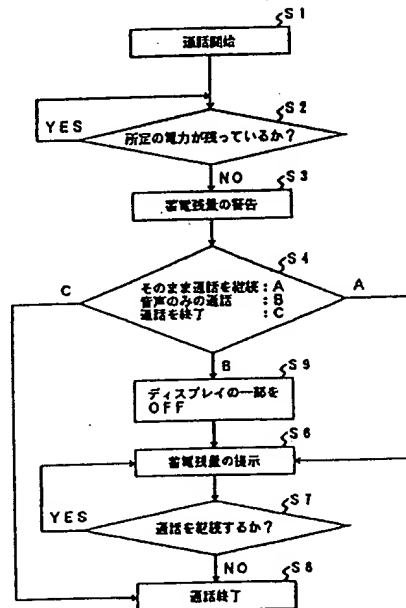
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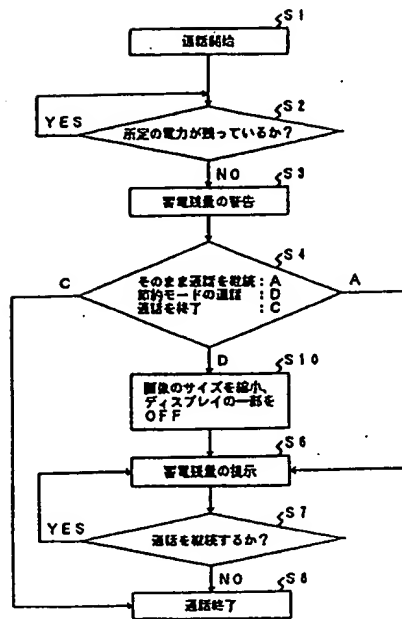
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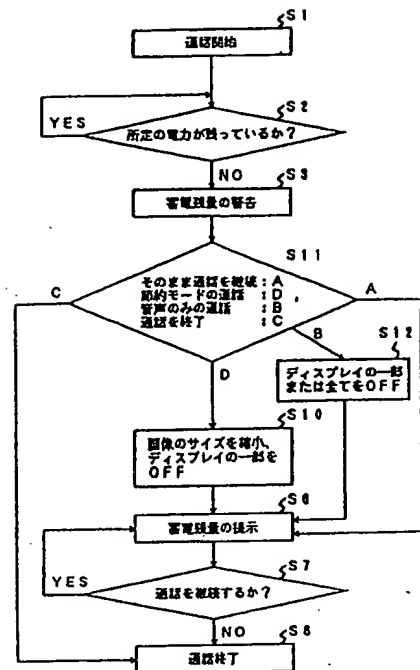
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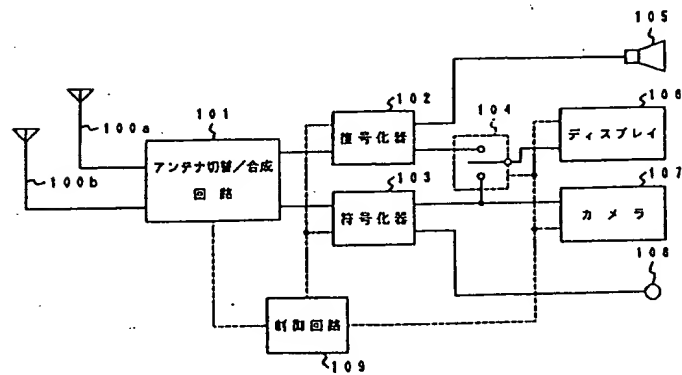
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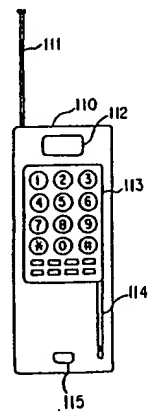
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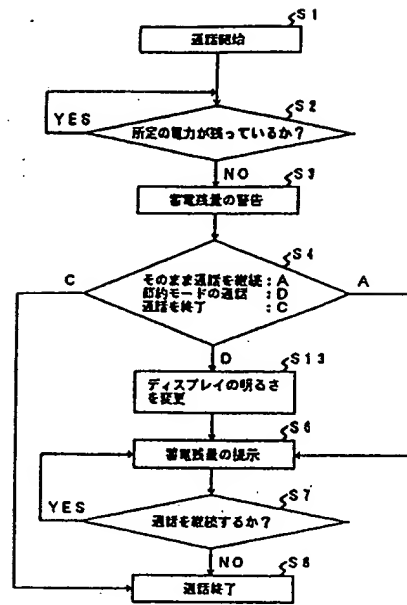
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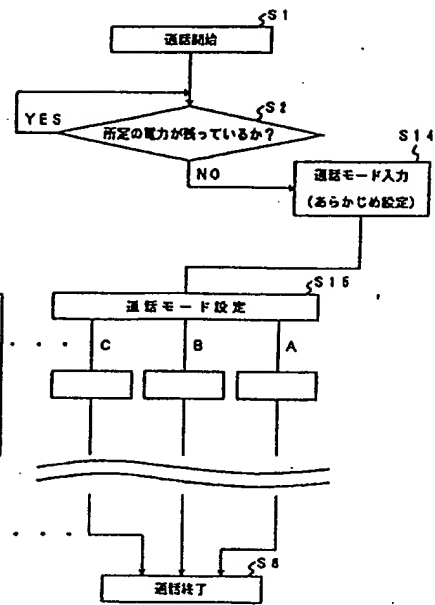
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【図24】



【図25】

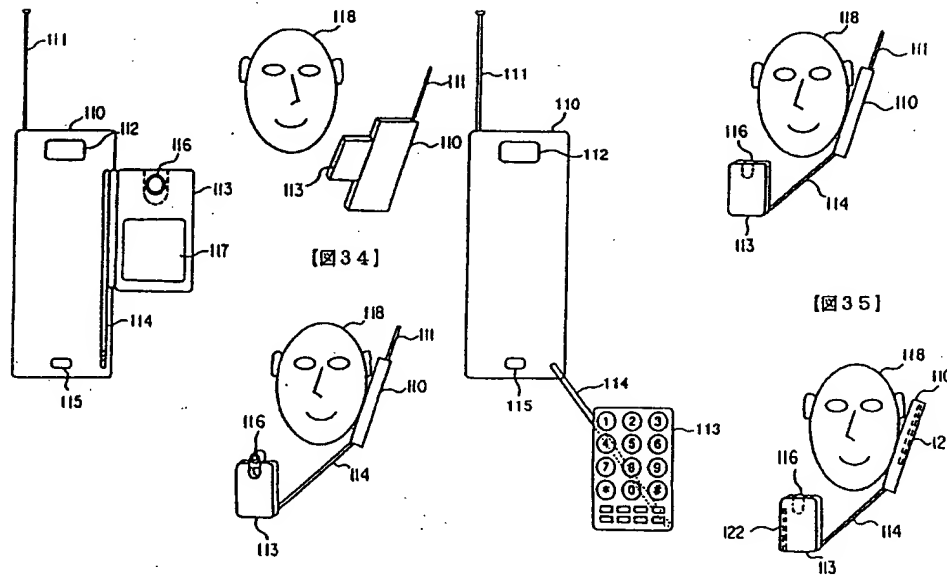


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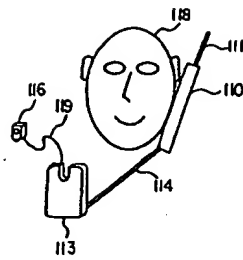
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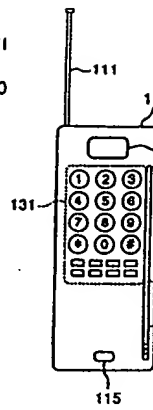
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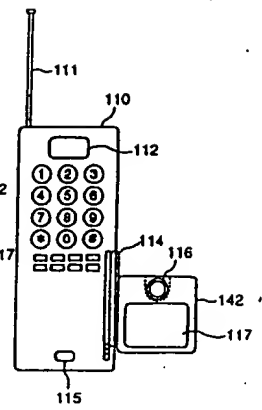
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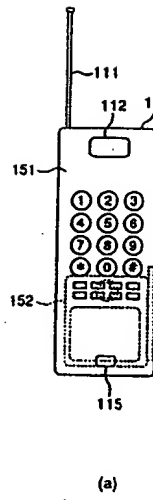
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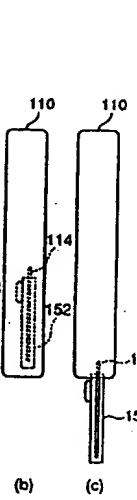
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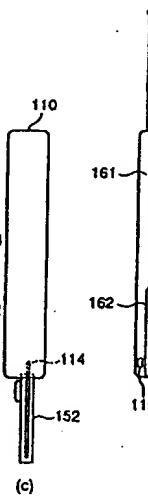
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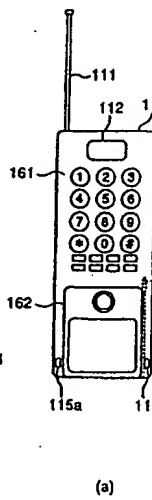


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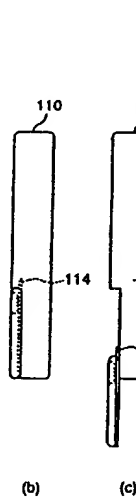


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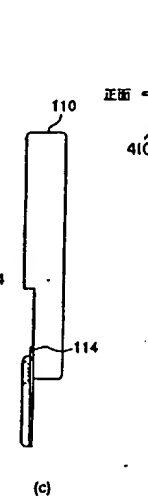
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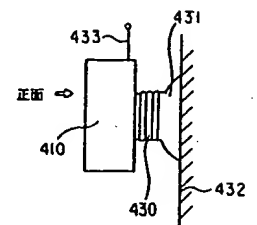


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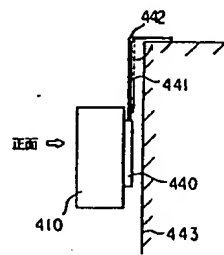


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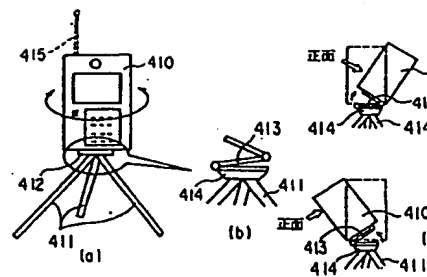
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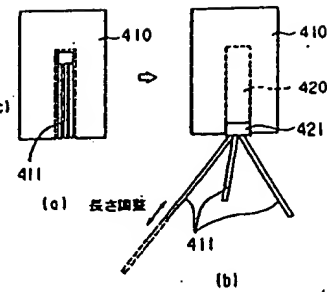
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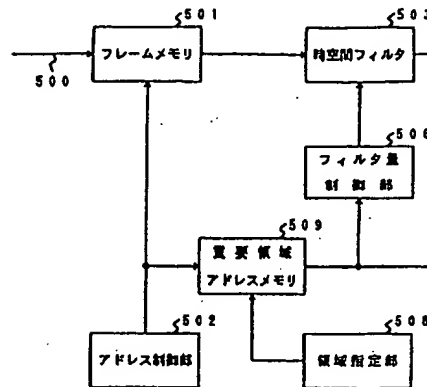
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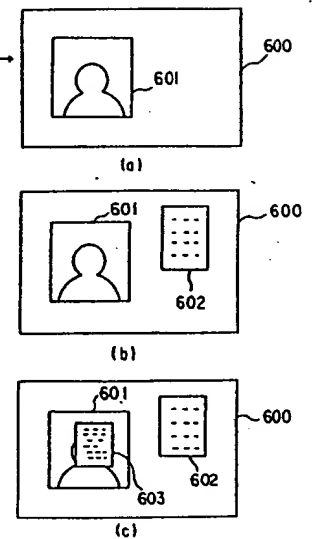
【図41】



【図44】



【図45】



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APPLICANT	(71):	TOSHIBA CORPORATION
TITLE	(54):	PORTABLE VIDEOPHONE
FOREIGN TITLE	[54A]:	Keitai Terebidenwa Sochi

[Claims]

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[Claim 1]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped
with a means for displaying images,
with a means for supporting this image-display means with the upper body of the user of the portable videophone in such a manner that the image-display means is positioned below the user's view,
with an image-reflecting means that is placed on the front of the aforesaid image-display means and that reflects the image of the user's face but allows the image on the image-display means to pass through, and
with a means for picking up the image on this image-reflecting means.

[Claim 2]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped
with a means for displaying images,
with a means for supporting this image-display means with the upper body of the user of the portable videophone in such a manner that the image-display means is positioned below the

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user's view,

with an image-reflecting means that is placed at a position adjacent to the image-display means and that reflects the image of the user's face, and with a means of picking up the image on this image-reflecting means.

[Claim 3]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a main body that is so configured that it can be folded and with an image-pickup means that is provided on this main body in such a manner that it is always exposed regardless of the portable-videophone main body's being folded or not.

[Claim 4]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a main body that is so configured that it can be folded, with an image-pickup means that is provided on this main body in such a manner that it is always exposed regardless of the portable-videophone main body's being folded or not, and with a supporting means that is so configured that, when the portable-videophone main body is folded, the distance from the bottommost portion of the main body of the portable videophone to the image-pickup means can be adjusted.

[Claim 5]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a main body that is so configured that it can be folded, with an image-pickup means that is provided on this main body in such a manner that it is always exposed regardless of the portable-videophone main body's being folded or not, with a first means for detecting whether the portable-videophone main body is folded or not, with a second means for detecting whether the portable-videophone main body is placed in the upright position or inverted position, and with a means for flipping video signals obtained by the image-pickup means from top to bottom when the first detection means detects that the portable-videophone main body is folded and, at the same time, the second detection means detects that it is in the upright position and also when the first detection means detects that the portable-videophone main body is not folded and, at the same time, the second detection means detects that it is in the inverted position.

[Claim 6]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a portable-videophone main body,

with a first and second operating means that are each provided on the right and left sides, respectively, of the main body, and with a means for assigning a function to the first and second operating means.

[Claim 7]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a portable-videophone main body that has an image-pickup means and an image-display means, with a first and second operating means that are each provided on the right and left sides, respectively, of the main body and that are used for adjusting the scaling of the image displayed on the image-display means that has been picked up by the image-pickup means, and with a means for assigning a function to the first and second operating means.

[Claim 8]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a portable-videophone main body that has an image-display means and an image-pickup means, with a supporting means that supports this portable-videophone main body in a standing position, and with an operating means that is provided on the main body in a

detachable/attachable manner and that is used for operating the main body.

[Claim 9]

A portable videophone that has a battery as the power source and that transmits/receives voices and images by radio, said portable videophone being characterized by the fact that it is equipped with a means for displaying images, with a means for detecting the charge level of the battery, and with a means for suspending at least part of the image-display means or for changing the display mode when the level of battery charge detected by the charge-level detecting means drops below a given value.

[Claim 10]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped

with a portable-videophone main body that has a voice input/output section,

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with a panel that is provided on this main body in a detachable/attachable manner,

with an image-display means and an image-pickup means that are provided on this panel, and

with a means for connecting these image-display means and image-pickup means to the portable-videophone main body mechanically and electrically.

[Claim 11]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a portable-videophone main body that has an antenna, with an image-display means and image-pickup means, at least one of which is provided on the main body in a detachable/attachable manner, and with a means for connecting, mechanically and electrically, the portable-videophone main body and the image-display means or image-pickup means, whichever is selected to be provided on the main body in a detachable/attachable manner, and by the fact that a space diversity antenna is comprised of the antenna and at least part of the structural components of the image-display means, image-pickup means, and connecting means.

[Claim 12]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with a portable-videophone main body that has an image-display means and an image-pickup means and with a supporting means that supports this main body in any given position and direction and that also functions as an antenna for signal transmission/reception.

[Claim 13]

A portable videophone for transmitting/receiving voices and images by radio, said videophone being characterized by the fact that it is equipped with an area-specifying means that can specify several important areas in an overlapping manner on a received image or an image to be transmitted and with a coding/transmission means that codes and transmits, among the image information of the areas specified by this area-specifying means, the video information of an area where a plurality of areas overlap with higher quality than the video information of an area that does not overlap.

[Detailed Explanation of the Invention]

[0001] [Industrial Field of Application]

The present invention pertains to a portable videophone that transmits/receives voices and images by radio.

[0002] [Prior Art]

What are called portable videophones, which are portable terminal devices that transmit/receive voices and images by radio, are being developed. This type of portable videophone is disclosed, for example, in Kokai 3-109891. With a portable videophone, while transmitting the image of his face to the other party and also receiving the image of the face of the other party, the user can speak to the other party as in a normal conversation, thereby improving convenience.

[0003]

Figure 6 shows an external view of a prior portable videophone. Provided on the front of main body (211) of the portable videophone are camera (212), display (213), microphone (214) [sic], speaker (215), and operating buttons (216). The transmission/reception of audio and video signals is carried out through antenna (217). When making a call, the user holds main body (211) of the portable videophone with one hand and holds it up in front of his face to use it. This type of prior videophone, however, presents the following problems.

[0004]

(1) There are various conceivable situations in which portable videophones are used, some examples of which are such as when one is walking or standing on a street, riding a train, driving a car, sitting on a chair or bench indoors or outdoors, carrying out light exercise, such as jogging, etc. Among these situations, when the user is driving a car or carrying packages with both hands, it is difficult to use his hands for holding and operating a portable videophone. However, prior videophones require the use of at least one hand for holding and operating the phone; therefore, they are not made to handle these situations. Even in other situations, it is inconvenient, in many cases, to have one hand constrained by using a portable videophone:

[0005]

(2) As a special application of portable videophones, as seen in the situation in which a police officer, who rushes to a crime scene, transfers the surrounding sights to a police station, portable videophones are used to transfer the view of the user to another place without being held by hands, and, in a situation like this, there is a need for placing a portable videophone in, for example, a breast pocket in such a manner that only the camera portion is exposed from the pocket. However, because breast pockets come in various depths, it is not always possible to place the main body in such a manner as to expose only the camera portion. Furthermore, there is also a demand for the function of monitoring the surrounding in all directions with the camera, but prior portable videophones are not made to handle this demand.

[0006]

(3) There are known techniques for displaying the image of the user's face on the display to monitor in what size the image will be transmitted, but there is a demand for portable videophones to be equipped with the function of adjusting this size, that is to say, the scaling of the image, easily by either a left-handed or right-handed person, with the tips of the fingers of the hand that holds the main body of a portable videophone.

[0007]

(4) Instead of being held by a hand, portable videophones are sometimes placed upright on a desk top, etc. and used; however, if a prior portable videophone shown in Fig. 6 is operated in a standing position, the set is knocked over by the force of the hand, or the image of the user's face is not picked up correctly.

[0008]

(5) Charge-type batteries (secondary batteries) are normally built in portable videophones as the power source and are used for signal processing, such as the inputting/outputting and coding/decoding of voices and images. Among them, a large amount of power is required for outputting images to the display and for coding/decoding images. On the other hand, a small amount of power is sufficient for inputting/outputting and coding/decoding voices. Because the image processing and voice processing are always implemented simultaneously in prior videophones even when the battery is weak, the battery runs down quickly due to the image processing. /4

[0009]

(6) There is a demand for portable videophones that, like prior portable voice telephones, can be used by placing the speaker portion of the transmission/reception device against the ear, because this mode is more familiar and easier to use. However, in this mode of application, the prior portable videophone shown in Fig. 6 cannot pick up the image of the user's

face, or the user cannot watch the received image.

[0010]

(7) When one uses portable videophones while travelling in a train or by car, a countermeasure against fading is required at the time of reception in order to prevent transmission errors. Especially when image signals are transmitted/received by narrow-band radio, extensive band compression by high-efficiency compression coding is necessary, and, consequently, there is a possibility that a transmission error can cause considerable image deterioration. A known fading countermeasure is space diversity that employs several antennas and switches or synthesizes the output of each antenna appropriately (for example, the "diversity antenna device" in Kokai 4-274625). In this system, it is preferred to be able to adjust the spacial arrangement of a plurality of antennas in order to improve performance, but this kind of adjustment of the antenna arrangement is not possible with prior videophones.

[0011]

(8) Regarding an image-coding/transmission device that compression-codes and transmits video information with high efficiency, there is a known technique that specifies from, for example, the receiving end, important areas, such as the image of the face of the other party at the transmitting end or document images, and codes and transmits the video information within the specified areas in higher quality than the video information within other areas. With the prior technology, even when several

areas are specified in an overlapping manner, the overlapping areas and non-overlapping areas are coded with the same quality; therefore, if there is a more important area within an important area, the image within this area cannot be displayed in higher quality.

[0012] [Problems that the Invention is to Solve]

As stated in the foregoing, prior portable videophones have the following problems: (1) using a videophone constrains one of the user's hands, which is inconvenient; (2) it is not possible to pick up the image of the user's surroundings with a videophone kept in a breast pocket of the user's clothes; (3) the finger-tip adjustment of image scaling cannot be carried out by both left-handed and right-handed people; (4) when a portable videophone is placed in a standing position and used, operating it in this condition is difficult, and the image of the user's face cannot be picked up and transmitted correctly; (5) the battery runs down quickly; therefore, communications cannot be continued for a long time; (6) prior portable videophones cannot be used in the same mode as portable voice telephones, which are used by placing the speaker portion of the transmission/reception device against the ear; (7) the freedom of antenna arrangement that is required when space diversity is implemented is small; (8) when several important areas are specified on the image in an overlapping manner, even if there is a more important area within an important area, the image in this area cannot be coded in higher quality than the other areas to be transmitted and displayed.

[0013]

The present invention intends to solve these problems of prior portable videophones. More specifically, a first objective of the present invention is to offer a portable videophone that can be used without using hands.

[0014]

A second objective of the present invention is to offer a portable videophone that can pick up the surroundings of the user when the videophone is kept in a breast pocket.

[0015]

A third objective of the present invention is to offer a portable videophone that allows both right-handed and left-handed people to easily carry out such operations as the adjusting of image-pickup scaling with a finger tip.

[0016]

A fourth objective of the present invention is to offer a portable videophone that, even when it is used in a standing condition, can be operated with ease and can pick up and transmit the image of the user's face correctly.

[0017]

A fifth objective of the present invention is to offer a portable videophone that can continue communications for a long period of time even when a battery is used.

[0018]

A sixth objective of the present invention is to offer a portable videophone that, like portable voice telephones, can be

used by placing the speaker portion of the transmission/reception device against the ear.

[0019]

A seventh objective of the present invention is to offer a portable videophone that has a large degree of freedom of antenna arrangement, which is required for implementing space diversity.

[0020]

An eighth objective of the present invention is to offer a portable videophone that can specify several important areas on the image in an overlapping manner and that can code, transmit, and display the video information of the especially important areas in higher quality than the video information of the rest of the important areas.

[0021] [Means of Solving the Problems]

In order to attain the first objective, a portable videophone pertaining to the first invention is characterized by being equipped with a means for displaying images, with a means for supporting this image-display means with the upper body of the user of the portable videophone in such a manner that the image-display means is positioned below the user's view, with an image-reflecting means that is placed on the front of the aforesaid image-display means and that reflects the image of the user's face but allows the image on the image-display means to pass through, and with a means for picking up the image on this image-reflecting means.

of the portable videophone to the image-pickup means can be adjusted.

[0025]

Another portable videophone pertaining to the second invention is characterized by being equipped with a main body that is so configured that it can be folded, with an image-pickup means that is provided on this main body in such a manner that it is always exposed regardless of the portable-videophone main body's being folded or not, with a first means for detecting whether the portable-videophone main body is folded or not, with a second means for detecting whether the portable-videophone main body is placed in the upright position or inverted position, and with a means for flipping video signals obtained by the image-pickup means from top to bottom when the first detection means detects that the portable-videophone main body is folded and, at the same time, the second detection means detects that it is in the upright position and also when the first detection means detects that the portable-videophone main body is not folded and, at the same time, the second detection means detects that it is in the inverted position.

[0026]

A portable videophone pertaining to the third invention is characterized by being equipped with a portable-videophone main body, with a first and second operating means that are each provided on the right and left sides, respectively, of the main body, and with a means for assigning a function to the first and

second operating means.

[0027]

Another portable videophone pertaining to the third invention is characterized by being equipped with a portable-videophone main body that has an image-pickup means and an image-display means, with a first and second operating means that are each provided on the right and left sides, respectively, of the main body and that are used for adjusting the scaling of the image displayed on the image-display means that has been picked up by the image-pickup means, and with a means for assigning a function to the first and second operating means.

[0028]

A portable videophone pertaining to the fourth invention is characterized by being equipped with a portable-videophone main body that has an image-display means and an image-pickup means, with a supporting means that supports this portable-videophone main body in a standing position, and with an operating means that is provided on the main body in a detachable/attachable manner and that is used for operating the main body.

[0029]

A portable videophone pertaining to the fifth invention is characterized by being a portable videophone that has a battery as the power source and by being equipped with a means for displaying images, with a means for detecting the charge level of the battery, and with a means for suspending at least part of the image-display means or for changing the display mode when the

level of battery charge detected by the charge-level detecting means drops below a given value.

[0030]

A portable videophone pertaining to the sixth invention is characterized by being equipped with a portable-videophone main body that has a voice input/output section, with a panel that is provided on this main body in a detachable/attachable manner, with an image-display means and an image-pickup means that are provided on this panel, and with a means for connecting these image-display means and image-pickup means to the portable-videophone main body mechanically and electrically.

[0031]

A portable videophone pertaining to the seventh invention is characterized by the fact that it is equipped with a portable-videophone main body that has an antenna, with an image-display means and image-pickup means, at least one of which is provided on the main body in a detachable/attachable manner, and with a means for connecting, mechanically and electrically, the portable-videophone main body and the image-display means or image-pickup means, whichever is selected to be provided on the main body in a detachable/attachable manner, and by the fact that a space diversity antenna is comprised of the antenna and at least part of the structural components of the image-display means, image-pickup means, and connecting means.

[0032]

Another portable videophone pertaining to the seventh invention is characterized by being equipped with a portable-videophone main body that has an image-display means and an image-pickup means and with a supporting means that supports this main body in any given position and direction and that also, functions as an antenna for signal transmission/reception.

[0033]

A portable videophone pertaining to the eighth invention is characterized by being equipped with an area-specifying means that can specify several important areas in an overlapping manner on a received image or an image to be transmitted and with a coding/transmission means that codes and transmits, among the image information of the areas specified by this area-specifying means, the video information of an area where a plurality of areas overlap with higher quality than the video information of an area that does not overlap.

[0034] [Operation]

(1) Because the portable videophone pertaining to the first invention places the image-display means below the user's view at the upper body of the user, both of the user's hands are free, and the videophone can be used without the main body's obstructing the user's view.

[0035]

Because this videophone picks up the image from the image-reflecting means that is provided on the front of the

image-display means or provided at a position adjacent to the image-display means, the distance from the image-pickup means and the face is extended substantially, almost twofold; therefore, the range of image pickup can be expanded even when a camera with the same viewing angle is used.

[0036]

(2) The portable videophone pertaining to the second invention uses the means of supporting the portable-videophone main body for adjusting the length from the bottommost portion of the main body to the image-pickup means, thereby making it possible to expose the image-pickup means from a breast pocket in order to pick up images.

[0037]

By exposing the image-pickup means even when the main body is folded, the process of image pickup can be conducted while the display means is protected. Furthermore, when the image is flipped from top to bottom due to the folding or inverting of the main body, the video information is inverted and picked up, thereby making it possible to pick up images in a correct top/bottom relationship.

[0038]

(3) The portable videophone of the third invention makes it possible to adjust, easily and appropriately, the scaling, etc., of a picked-up image while displaying the picked-up image on part or all of the image-display section. By switching and setting the function assignment of the operating means in two ways, for

right-hand use and left-hand use, the videophone can be operated with ease by both right-handed people and left-handed people.

[0039]

In addition, because the operating means are placed on the sides of the main body, the user can easily operate them with a finger tip while holding the main body.

[0040]

(4) Regarding the portable videophone pertaining to the fourth invention, while the videophone is supported in a standing position on a desk, etc., the operating means can be removed from the portable-videophone main body and used; therefore, the image of the user's face can be picked up and transmitted correctly, and it also becomes possible to avoid knocking over the main body and shaking the picked-up image when the operating buttons on the main body are pushed.

[0041]

(5) The portable videophone pertaining to the fifth invention suspends part of the image-display means or changes the display mode when the charge level of the means for storing electricity drops below a given value, thereby limiting power consumption and making it possible to continue minimum-level communication by voice for a long period of time.

(6) The portable videophone pertaining to the sixth invention has the image-display means and image-pickup means provided on the operation panel, thereby protecting these means and also making it possible to use the transmission/reception

device of the main body by placing it against the ear for voice-only calls, like a prior portable voice telephone.

[0042]

(7) Regarding the portable videophone of the seventh invention, the antenna and at least part of the structural components of the image-display means, image-pickup means, and connecting means comprise a space diversity antenna, thereby improving the degree of freedom of the antenna arrangement that is required for implementing space diversity.

[0043]

By imparting the freedom of rotation, expansion, etc., to the connecting means, this portable videophone has an advantage in that the positioning of the image-display means and the image-pickup means is easy.

[0044]

Regarding the portable videophone of the eighth invention, when a plurality of important areas are specified on an image in an overlapping manner, especially important video information of an area that overlaps can be coded, transmitted, and displayed in higher quality than the video information of other important areas.

[0045] [Working Examples]

The following explains working examples of the present invention, referring to figures.

[0046] (Working Example 1)

Figure 1 is an external view of the portable videophone pertaining to the present working example. In this figure, supporting member (201) is made from an elastic material, such as a plastic, etc., and is a ring-shaped member that is bifurcated at one section, and, with this supporting member (201), display (202), such as a liquid-crystal display, and camera (203) are so supported that the angle of each device can be changed.

[0047]

Display (202) is supported at one side of supporting member (201), and camera (203) is supported at a side that is adjacent to this side and is turned toward display (202). Supporting member (201) is made hollow, and the cord for earphone (204), which functions for both inputting and outputting voices, that is to say, functions as a microphone and a speaker, is pulled out from it. By pulling earphone (204), the length of the cord can be extended.

[0048]

It is also possible to place the earphones at the bifurcated section (cut section) and use them by holding them to both ears like a stethoscope. This configuration eliminates the need to extend or shorten the cord of earphone (204). The video and audio processing circuitry (not shown) is stored in case (205), which is fastened to supporting member (201).

[0049]

As shown in Fig. 2, to use this device, supporting member (201) is hung around the user's neck. In this condition, because display (202) is located below the face of the user, the user can look at the image on display (202) without his view's being obstructed.

[0050]

Thus, the portable videophone of the present working example can be used while keeping both hands free and without its main body's obstructing the user's view.

[0051]

Although camera (203) can be mounted on the periphery of display (202) as shown in Fig. 3, only part of the face can be picked up in this case, unless the viewing angle of camera (203) is large enough. If a camera with a wide viewing angle is used, there is a possibility of warping the picked-up image. Thus, the present working example provides image-reflecting surface (206) on the front of display (202) so that the image of the user's face is reflected on this image-reflecting surface and picked up by camera (203).

[0052]

Here, image-reflecting surface (206) is comprised of a half mirror or a polarized filter, with which the image on display (202) can be seen through from the angle of the user's eye, but the reflected light can be seen from another angle, for example, from the position of camera (203). Supposing that the

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distance between the user's face and camera (203) in Fig. 3 is L , this configuration makes the length of the path between the face to camera (203) via image-reflecting surface (206) in Fig. 2 about $2L$; as a consequence, even a camera with a narrow viewing angle can pick up the image of the whole face.

[0053] (Working Example 2)

Figure 4 is a drawing that shows the configuration of the essential components of the portable videophone pertaining to the present working example, and, instead of providing image-reflecting surface (206) on the front of display (202) as in Fig. 1, this example provides image reflector (207), which is comprised of a regular mirror, adjacent to display (202). In this case, the image of the user's face is reflected by image reflector 207 and picked up by camera (203).

[0054] (Working Example 3)

Figure 5 is a schematic representation of the portable videophone pertaining to the present working example, and this videophone is configured so that supporting member (202) is placed on the user's shoulder. Although it becomes somewhat more difficult to see the image on the display compared to Working Examples 1 and 2, this configuration has the advantage of expanding the range of the frontal view of the user.

[0055] (Working Example 4)

Figure 7 is a perspective view of the portable videophone pertaining to the present working example. Flat base (220), which has the operating section, sound input/output section,

etc., and lid (223), on which display (221) and camera (222) are provided, are connected so as to move circularly, thereby configuring the portable videophone foldable as a whole. Camera (222) is located near the section of lid (223) where the lid connects to base (220).

[0056]]

On base (220), opening (220a) is provided at the position which faces camera (222) when the device as a whole is folded. Base (220) also has stand (224) as the supporting means, with which the videophone can be placed on a desk, etc., to be used. Stand (224) is mounted to base (220) in such a manner that it can slide along the slits formed on both sides of base (220), and this configuration makes it possible to change the distance between the tip of stand (224) and opening (220a), that is to say, the distance between the bottom of the main body to camera (222).

[0057]

Figure 8 is an external view of the portable videophone shown in Fig. 7 in the folded condition. When there is no need to watch received images, folding the device in this manner protects display (221). Even when the portable videophone is folded like this, the front of camera (222) is exposed through opening (220a) provided on base (220). Therefore, by placing the folded portable videophone in the breast pocket of the user as shown in Fig. 9, the user can pick up the image of scenery without using his hands. If the pocket is too deep and hides

camera (222) inside it, stand (224) is slid and extended to set the distance between camera (222) and the tip of stand (224) longer so that camera (222) is exposed from the pocket.
[0058]

Figure 10 shows an example in which the portable videophone is folded as in Fig. 8 and hung upside down in relation to the condition shown in Fig. 8 on an object, such as hook (225), using stand (224), and the image of the user's face, etc., is picked up in this condition.
[0059]

Thus, the portable videophone of the present invention can pick up images in various modes of application, such as a mode in which, as shown in Fig. 7, the videophone is placed upright on a desk, etc., by stand (224), a mode in which the videophone is folded as shown in Fig. 8 and held inside a breast pocket as shown in Fig. 9, and a mode in which the videophone is folded as shown in Fig. 8 and hung on hook 225 using stand (224) as shown in Fig. 10.

[0060]

When images are picked up in the condition shown in Fig. 7 and in the condition shown in Fig. 9, the top and bottom of the images obtained in these conditions are inverted. When images are picked up in the condition shown in Fig. 9 and in the condition shown in Fig. 10, although the videophone is folded in both cases as shown in Fig. 8, the top and bottom of the image are also inverted. Therefore, if the videophone is so configured

that the correct image is obtained when the image is picked up in the condition shown in, for example, Fig. 7, the top and bottom of the image picked up in the condition shown in Fig. 9 is inverted; therefore, if it is displayed as it is, the image is hard to see.

[0061]

Figure 11 is a block diagram that shows the configuration of a signal-processing system for solving this problem. Video signals from camera (222) are input to switch (227) directly or through top/bottom flipping circuit (226). Switch (227) selects the video signal output from camera (222) when the switching control signal input from exclusive OR (EXOR) circuit (230) is "L" and selects the flipped video signal that is flipped by top/bottom flipping circuit (226) when the switching control signal is "H", and it then transmits the signals to an encoder (not shown).

[0062]

Lid open/close detector (228) is a detector that outputs "H" when lid (223) is open and outputs "L" when it is closed and is comprised of a switch that is operated by the opening/closing of lid (223). Top/bottom flipping detector (229) is a detector that outputs "H" when the portable videophone is in an upright position (in the conditions shown in Figs. 7 to 9) and outputs "L" when it is in an inverted position (in the condition shown in Fig. 10) and is comprised of, for example, a switch that is activated by the transfer of the weight by gravity. These

outputs from lid open/close detector (228) and top/bottom flipping detector (229) are input to EXOR circuit (230), and the output of EXOR circuit (230) is transmitted to switch (227) as a switching control signal.

[0063]

When lid (223) is open and, at the same time, the videophone is in an upright position, that is to say, it is in the condition shown in Fig. 7, lid open/close detector (228) and top/bottom flipping detector (230) both output "H", and, consequently, EXOR circuit (230) outputs "L". As a result, switch (227) transmits to the encoder the video signal output from camera (222) as it is output.

[0064]

On the other hand, when lid (223) is closed and, at the same time, the videophone is in an upright position, that is to say, it is in the condition shown in Figs. 8 and 9, lid open/close detector (228) outputs "L" and top/bottom flipping detector (230) outputs "H"; therefore, EXOR circuit (230) outputs "H". As a consequence, switch (227) transmits the video signal that has been inverted at top/bottom flipping circuit (226) to the encoder.

[0065]

When lid (223) is closed and, at the same time, the videophone is in the inverted condition, that is to say, it is in the condition shown in Fig. 10, lid open/close detector (228) and top/bottom flipping detector (230) both output "L"; therefore,

EXOR circuit (230) outputs "H". As a consequence, switch (227) transmits to the encoder the video signal output from camera (222) as it is output.

[0066] (Working Example 5)

Figure 12 is a perspective view of the portable videophone pertaining to the present working example, and this working example is so configured that enclosure (237) of the camera rotates automatically together with the image-pickup system inside the main body of the portable videophone.

[0067]

In this working example, as shown in Fig. 13, the subject image is formed on CCD image-pickup device 234 through lens (233) and converted into electrical signals, and picked-up video signals (235) are transmitted to encoder (236). Here, enclosure (237) of the camera is connected to motor (239) via belt (238), and it rotates along with the rotation of motor (239).

[0068]

This working example has an advantage in that, while the portable videophone is held inside a breast pocket, etc., the camera can monitor the user's surroundings in every direction.

[0069] (Working Example 6)

Figure 14 is an external view of the portable videophone pertaining to the present working example, and this example is configured so that the scaling of images can be adjusted. Display screen (301) of the display is comprised of area (301a), where the image from the other party is shown, and area (301b),

which is provided at the bottom right and shows the image from the user. When camera (302) picks up the image of the user's face, the picked-up video signals are coded and transmitted from antenna (308). Simultaneously with this, the coded video signals are decoded and displayed in area (301b). The image from the other party decoded from video signals received by antenna (308) is displayed in area (301a).

[0070]

In the present working example, for adjusting the scaling of lens (302), right-hand-use scaling adjustment knob (303) and left-hand-use scaling adjustment knob (304) are provided on either side of main body (300). Turning these knobs (303 and 304) causes lens (302) to zoom in and out. To initially select between the right-hand-use and left-hand-use scaling adjustment knobs (303 and 304), setup button (309) shown in Fig. 15 is used. If, for example, the user selects the right-hand-use scaling adjustment knob (303), from then on, the left-hand-use scaling adjustment knob (304) is set so as not to operate at all or is given another function.

[0071]

Returning to Fig. 14, panel (305) on which buttons for specifying telephone numbers are arranged (hereinafter referred to as the telephone-number-specifying panel) is provided in a detachable/attachable manner, as discussed later. The voice from the user is detected by microphone (306), and the audio signal is coded inside main body (300) and transmitted from antenna (308).

The coded audio signal received from the other party is decoded and output from speaker (307) as a voice. It is preferred to position microphone (306) and speaker (307) on the main body with some distance between them so as to prevent howling.

[0072] In Fig. 15, power switch (310) is provided on the side of main body (300). If the user is right-handed, he can hold main body (300) with his right hand and operate power switch (310), setup button (309), and right-hand-use scaling adjustment knob (303), all with one hand.

[0073]

Figure 16 shows display screens that are seen when scaling adjustment knob (303 or 304) is operated to change the scaling of the lens. In Fig. 16(a), as the result of zooming in on the user's face with the lens, the enlarged image of the user's face is input, and his face is displayed in a large size at the bottom right of display screen (301). In Fig. 16(b), as the result of zooming out, the scaled-down image of the user's face is input, and his face is displayed in a small size at the bottom right of display screen (301). In either case, while holding the main body with one hand and maintaining the distance between the main body and the face constant, the user can monitor the image of his own face at a desired size.

[0074]

Figure 17 shows the videophone shown in Fig. 14 from which telephone-number-specifying panel (305) is removed. Main body (300) and telephone-number-specifying panel (305) are connected

by signal line (312). Main body also has leg (311). Therefore, the user can sit at the table, place the main body upright on the table, remove telephone-number-specifying panel (305), and input a telephone number. Once the communication with the other party starts, keeping both his hands free, the user can converse while watching the screen. Therefore, the user can use his hands to do other work (such as writing, etc.) in tandem with the conversation.

[0075]

The scaling adjustment knobs for the lens and the knobs for adjusting sound volume, brightness of the display, and the like, which are operated even during a call, are usually provided on main body (300), and the force of the fingers that operate these knobs moves main body (300) and shakes the camera, which results in the transmission of distorted images to the other party.

Thus, if these adjustment knobs are provided on removable telephone-number-specifying panel (305), various adjustments can be carried out without the camera's being shaken. Furthermore, in the present working example, main body (300) and panel (305) are connected by signal wire (312), that is to say, in a wired mode, but they can, of course, be connected in a wireless mode.

[0076] (Working Example 7)

Portable videophones generally use rechargeable batteries as the power source. This battery is used for supplying power to the section that codes and transmits input images, the section that decodes and displays the coded images that are received, the

section that codes and transmits the input sound, and the section that decodes and outputs the received sound. Among these sections, the sections that relate to the display of images consume considerably more power than the other sections.

[0077]

For this reason, in the present working example, a means for detecting a weak battery is provided, and, when the remaining charge of the battery drops below a given value, displaying images is suspended as seen on display screen (313) in Fig. 18. This makes it possible to continue voice-only communications as long as possible. With voice-only communications without images, the user can still communicate well enough with the other party.

[0078]

Figure 19 is a block diagram of the portable videophone pertaining to the present working example. Lens scaling-adjustment section (314) is the equivalent of adjustment knobs (303 and 304), which have been explained in reference to Working Example 5, and the scaling information set by this adjustment section (314) is sent to camera (315). According to this scaling, camera (315) picks up the image of the user's face.

[0079]

The video signals output from camera (315) are converted into digital signals by analog-to-digital converter (316), undergo processes of pre-filtering, face recognition, etc., and are further subjected to motion compensation and discrete cosine transformation by coding section (318) to be coded. These coded

signals of the image of the face are transmitted through multiplexer (319) to the videophone of the other party.

[0080]

The coded video signals of the face are also sent to decoding section (323), where they are decoded, and, subsequently, they are subjected to the processes of post-filtering, etc., by post-processing section (322) and converted into analog signals by digital-to-analog converter (321), after which they are transmitted to display (320) and displayed in area (301b) at the bottom right of display screen (301) shown in Fig. 14. This makes it possible for the user to monitor the size and condition of the image of his face.

[0081]

Meanwhile, the coded video signals of a face transmitted from the other party are also sent through multiplexer (319) to decoding section (323) to be decoded, undergo the processes of post-filtering, etc., at post-processing section (322), and are converted into analog signals by digital-to analog converter (321), and they are subsequently sent to display (320) and displayed in area (301a) of display screen (301) shown in Fig. 14.

[0082]

The voice from the user is picked up by microphone (319), and, after it is coded by voice coding section (326), it is transmitted to the other party through multiplexer (319). The coded voice from the other party is transmitted through

multiplexer (319) to voice coding section (326), where it is decoded, and is output from speaker (328). Voice coding section (326) has the function of coding/decoding voices.

[0083]

Battery (324) is a rechargeable type and supplies power to each section shown in Fig. 19. The remaining charge of this battery (324) is constantly detected by weak-battery detecting section (325). When the remaining charge drops below a given value, weak-battery-detecting section (325) outputs a suspension-instruction signal to the sections that implement processes that relate to images, that is, display (320), digital-to-analog converter (321), post-processing section (322), and decoding section (323). Upon receiving this signal, decoding section (323) suspends the decoding process of the coded image signals from the other party and from the user end, and post-processing section (322), digital-to-analog converter (321) and display (320) also suspend their operations. As a consequence, display (320) becomes like display screen (313) shown in Fig. 18 and displays nothing. Therefore, power consumption is reduced by as much as the power saved by suspending the operations related to image processing, thereby making it possible to continue a call as long as possible.

[0084] (Working Example 8)

Figure 20 is a flow chart that shows the process of monitoring the power consumption in the portable videophone pertaining to the present invention. When at call-initiating

step (S1) the procedure of making a call is implemented, the consumed power volume is monitored at power-consumption-monitoring step (S2) to determine if a predetermined volume of power is still remaining or not. If the given amount of power is remaining, the power consumption continues to be monitored. If the given amount of power is not remaining, the user is notified at power-level warning step (S3) that the remaining volume of the power is small. Here, the warning to the user can be carried out by using sounds, voices, LED lamps and the like, by displaying to the adjustment [sic], or by methods that combine these.

[0085]

After notifying the user that the remaining power volume is small, at call-mode-selecting step (S4), a selection is made between Mode A: the call is continued (keeping the display on), Mode B: the display is turned off, and the call is continued with voice only, and Mode C: the call is terminated. In the following explanation, the adjustment's [sic] on/off condition not only indicates that images are displayed or not displayed but also indicates that, when the adjustment [sic] is a liquid-crystal display that has a back light, the back light is turned on or off.

[0086]

If Mode A is selected at call-mode-selecting step (S4), after remaining-charge-indicating step (S6) is implemented, call-continuation-determination step (S7) is carried out. If Mode B is selected, after digital [sic] OFF step (S5) is implemented,

call-continuation-determination step (S7) is carried out. If Mode C is selected, call-termination step (S8) is carried out.

[0087] (Working Example 9)

Figure 21 is a flow chart that shows the process of monitoring the power consumption in the portable videophone pertaining to the present invention, and this is an example that the remaining charge is shown on the display of the portable videophone. In the present working example, at call-mode-selecting step (S4), part of the display is turned off (S9) and, on part of the remaining section, the remaining charge level is indicated. The rest of the procedure is the same as in Fig. 20.

[0088] (Working Example 10)

Figure 22 is a flow chart that shows the process of monitoring the power consumption in the portable videophone pertaining to the present invention. Up to call-mode-selecting step (S4), Fig. 22 is the same as Figs. 20 and 21, but, if Mode D: conservation-mode call is selected at call-mode-selecting step (S4), a scaled-down image is shown on part of the display and the rest of the display is turned off (S10). Other procedures are the same as in Figs. 20 and 21.

[0089]

The example in Fig. 22 displays a scaled-down image, but it is also feasible to configure an example that displays only part of the image, instead of scaling down the image. Regarding the example shown in Fig. 22, the display may be divided into a plurality of smaller display areas as shown in Fig. 26,

each of which is independently controlled so as to cause only, for example, display area e to display images. When a liquid-crystal display that has a back light is used, by dividing and controlling the back light as shown in Fig. 26, the power consumption by the back light can be reduced.

[0090] (Working Example 11)

Figure 23 is a flow chart that shows the process of monitoring the power consumption in the portable videophone pertaining to the present invention. At call-mode-selecting step (S11), in addition to Mode A: the call continued with no change and Mode C: the call terminated, this example is so configured that Mode B: voice-only call shown in Figs. 20 and 21 and Mode D: conservation-mode call shown in Fig. 22 can both be selected. When Mode B is selected, part or all of the display is turned off (S12), and, when Mode D is selected, a scaled-down image is shown on part of the display while the other part of the display is turned off (S10).

[0091] (Working Example 12)

Figure 24 is a flow chart that shows the process of monitoring the power consumption in the portable videophone pertaining to the present invention, and, in this case, when Mode D: conservation-mode call is selected at call-mode-selecting step (S4), the brightness of the display is changed (for example, made darker) at (S13).

[0092] (Working Example 13)

In Working Examples 8 to 12, the call mode is selected at call-mode-selecting step (S4) or S11 after a remaining charge warning is given; however, the present working example, as shown in Fig. 25, selects the call mode before initiating a call and stores it (S14), and, when the remaining charge becomes low, this set value is referred to in order to set the call mode (S15). In this case, a mechanism that can change the set call mode to a desired mode during a call may also be provided.

[0093]

In Working Examples 8 to 12, after a warning of the remaining charge at charge-level-warning step (S3) and the selection of the call mode at call-mode-selecting step (S4 or S11) are implemented, the remaining call [sic] level is indicated at remaining call [sic]-level-indicating step (S6), but it is possible to configure a videophone without these steps, and it poses no problem not to include the call-termination choice in the choices given at call-mode-selecting step (S4).

[0094]

Furthermore, when the display is changed in Working Examples 8 to 12, the change may be implemented in correspondence to the remaining charge level.

[0095] (Working Example 14)

Figure 27 is a block diagram of the portable videophone pertaining to the present working example. In order to implement space diversity, first and second antennas (100a and 100b) are

provided. Signals received by these antennas (100a and 100b) are selected or synthesized by antenna switching/synthesizing circuit (101) and input to decoder (102). Decoder (102) separates audio signals and video signals and decode them separately. The decoded audio signals are reproduced by speaker (105), and the decoded video signals are transmitted through display-switching device (104) to display (106), where they are displayed. A light-weight liquid-crystal display, etc., is suitable for display (106), but displays other than a liquid-crystal display can also be used.

[0096]

Meanwhile, at the time of transmission, audio signals that are input by microphone (109) and video signals picked up by camera (107) are coded and multiplexed by encoder (103) and transmitted from antenna (100a or 100b). Camera (107) is preferably a light-weight camera, such as a CCD, etc., but it is not limited to this. The video image obtained by camera (107) can be monitored on display (106) using display-switching device (104).

[0097]

Each component shown in Fig. 27 is controlled by control device (109). Antenna switching/synthesizing circuit (101) detects the reception conditions of antennas (100a and 100b) (for example, received electric field strength), and, based upon this detection result, the switching or synthesizing of the antennas is controlled. When signals are to be transmitted, a specific

antenna can be used, or an antenna to be used for transmission can be selected based upon the aforesaid detection result of reception conditions.

[0098]

The number of the antennas that configure space diversity is not limited to two, and more antennas can also be used.

[0099]

Figure 28 is an external view of the portable videophone pertaining to the present working example. In the figure, (110) is the main body of the portable videophone, (111) is a first transmission/reception antenna, (112) is a speaker, (113) is an operation panel that can be opened/closed, (114) is a rod-shape supporting member, and (115) is a microphone. The present working example is so configured that, when voice-only transmission/ reception is carried out without the transmission/reception of images, it can be used in the same manner as a prior portable telephone.

[0100]

Figure 29 is a view in which operation panel (113) is open. In the figure, (116) is a camera and (117) is a display panel. Operation panel (113) is connected with main body (110) by supporting member (114) so as to be opened and closed, and this supporting member (114) also functions as a second antenna.

[0101]

Although this example can be used in the condition shown in Fig. 29, it is also possible to use it in the manner shown in

Fig. 30, in which user (118) holds main body (110) away from his face and picks up the image while watching display panel (117). In this case, using a microphone with strong directionality for microphone (115) can reduce external noise.

/11

[0102]

Figure 31 shows a view in which operation panel (113) is fixed by supporting member (114) at a position away from main body (110). In this working example, supporting member (114) is comprised of an expandable rod that is configured so as to bend 180 degrees at a specific position, and both ends of supporting member (114) are each connected to the lower portion of main body (110) and the lower portion of operation panel (113). Supporting member (114) is not limited to the aforesaid configuration.

[0103]

Figure 32 is a drawing that illustrates a condition in which the user is actually making a call with the videophone. User (118) holds main body (110) like the receiver of a common telephone and picks up and displays images with camera (116) and display (117) provided on operation panel (113).

[0104]

Camera (116) may be configured in a detachable/attachable manner as shown in Fig. 29 [sic], and connecting it with operation panel (113) electrically by cable (119) increases the range that the camera can pick up. As shown in Fig. 34, camera (116) may also be mounted on operation panel (113) on one axis so that it can rotate about 180° around this axis. This

configuration facilitates an adjustment of the image-pickup position and also makes it possible to pick up the view ahead of the user.

[0105] (Working Example 15)

Figure 35 is a drawing that shows the configuration of the portable videophone pertaining to the present working example. This example has antennas (121 and 122) inside main body (110) and inside operation panel (113), respectively, as a plurality of antennas for implementing space diversity. It is, of course, feasible to configure supporting member (114) so that it also functions as an antenna, as in Working Example 14.

[0106] (Working Example 16)

Figure 36 is a drawing that shows the configuration of the portable videophone pertaining to the present working example, and, in this case, operation panel (131) is mounted on main body (110), while camera (116) and display (117) are built in another panel (132). When panel (132) is closed, it covers operation panel (131). Separating operating panel (131) in this way from panel (132), in which camera (116) and display (117) are built, makes panel (132) lighter.

[0107] (Working Example 17)

Figure 37 is a drawing that shows the configuration of the portable videophone pertaining to the present working example. This example has operation panel (141) at the upper portion of main body (110) and panel (142), in which camera (116) and display (117) are built, at the lower portion of main body (110).

This configuration allows the user to operate the device even when panel 142 is closed.

[0108] (Working Example 18)

Figure 38 is a drawing that shows the configuration of the portable videophone pertaining to the present working example. In this case, operation panel (151) is placed at the upper portion of main body (110), and panel (152), in which the camera and the display are built, is contained in a pocket provided at the lower portion of main body (110). To pick up or display images, panel (152) is pulled out. When panel (152) is in the pulled-out condition, it can be used to pick up and display images simultaneously with voice communications as in Fig. 30, and it can be used in the same manner as in Fig. 32, using supporting member (114).

[0109] (Working Example 19)

Figure 39 is a drawing that shows the configuration of the portable videophone pertaining to the present working example. In this example, operation panel (161) is positioned at the upper portion of main body (110), and panel (162), in which the camera and display are built, is built on the surface of the lower portion of main body (110). In this condition, this device can be used in the same manner as in Fig. 30, while it can also be used in the same manner as in Fig. 32 by separating panel (162) from main body (110) and supporting it with supporting member (114).

[0110]

Furthermore, in the present working example, two microphones (115a and 115b) arranged in an array are employed so as to improve directivity and to reduce noise.

[0111] (Working Example 20)

Figure 40 is a drawing that shows the configuration of the portable videophone pertaining to the present working example. In this working example, tripod (411) is used as a means of mounting the portable videophone and is connected to main body 410 of the portable videophone with mounting piece (412). This tripod (411) also functions as an antenna; therefore, when this tripod (411) is used, it is not necessary to use regular antenna 415. It is, of course, possible to implement space diversity using tripod (411) and antenna (415).

[0112]

Furthermore, the present working example is so configured that main body (410) of the portable videophone can rotate around mounting piece (412), thereby making it possible to change its orientation in all directions freely.

[0113]

If mounting piece (412) shown in Fig. 40 (a) is configured as shown in Fig. 40 (b), portable-videophone main body (410) can also change its orientation upward or downward. Tripod (411) is connected to orientation-changing piece (413) by mounting piece (414), and this orientation-changing piece (413) can be folded in three and can set and fix the orientation of portable-videophone

main body (410) placed on it.

[0114]

Figures 40 (c) and (d) are drawings that show the side view of portable-videophone main body (410) and indicate the conditions in which main body (410) is set to face upward and downward, respectively, using orientation-changing piece (413).

[0115]

If tripod (411) is also configured so that its leg length can be changed, portable-videophone main body (410) can be set and fixed in any direction that the user desires.

[0116] (Working Example 21)

Figure 41 is a drawing that shows the configuration of the portable videophone pertaining to the present working example, and (a) illustrates a condition in which tripod (411) is stored inside portable-videophone main body (410). The tripod can be carried separately, but it is more convenient to employ a storing method as shown in the figure.

/12

[0117]

When tripod (411) is used, the tripod is taken out from storage section (420) of portable-videophone main body (410), as shown in Fig. 41 (b), and its legs are spread out and adjusted to a desired length. In this case, securing device (421) connects tripod (411) and portable-videophone main body (410).

[0118] (Working Example 22)

Figure 42 is a drawing that illustrates a side view of the portable videophone pertaining to the present invention.

Portable-videophone main body (410) is connected to suction cup (431) through accordion-shape component (430) and mounted on glass plate (432) (or a wall on which a suction cup can be used) with this suction cup (431). This example uses antenna (433), but the orientation of the portable videophone can be adjusted using accordion-shape component (430). Suction cup (431) can be a magnet, and, in this case, the device can be mounted on a metal plate or other metal-made places.

[0119] (Working Example 23)

Figure 43 is a drawing that illustrates a side view of the portable videophone pertaining to the present invention. Provided on the back of portable-videophone main body (410) is hook-storage section (440) for storing hook (441), and hook (441) is normally stored inside this hook-storage section (440). To mount portable-videophone main body (410), after hook (441) is pulled out from hook-storage section (440) and its length adjusted, the tip clamp section (442) is opened and hooked on wall (443) to mount the device.

[0120]

In the case of this working example, hook (441) also functions as an antenna; therefore, it is not necessary to provide a separate antenna on portable-videophone main body (410). However, using both hook (441) and another antenna, space diversity can be implemented.

[0121] (Working Example 24)

Figure 44 is a block diagram that illustrates the configuration of the video-signal encoder of the portable videophone pertaining to the present working example. Video signals picked up by a camera (not shown) are written in and read from frame memory (501) frame by frame. In this case, the write address and read address of frame memory (501) are controlled by address control section (502).

[0122]

The video signals read from frame memory (501) are input to coding section (504) via space-time filter (503). In coding section (504), a predictive error is found by, for example, motion compensation prediction, and, after this predictive error is subjected to discrete cosine transformation at a DCT circuit, the obtained DCT coefficient is quantized by a quantization circuit, and, when necessary, variable-length coding is further implemented, thereby outputting coded signals (505).

[0123]

Space-time filter (503) carries out low-pass filtering on the video signals sent from frame memory (501), and the degree of filtering is controlled by filtering-degree control section (506). The quantizing width (quantizing step size) of the quantization circuit inside coding section (504) is controlled by quantizing-width control section (507).

[0124]

Area-specifying section (508) is for specifying important areas according to the instruction from the user at the receiving end or transmitting end of the portable videophone. To implement this area-specifying section (508), the following method may be employed. Over a display (not shown) for displaying a decoded image at the receiving end or picked-up image at the transmitting end (or a locally decoded image obtained inside coding section (504)), a transparent touch panel is placed, and an area is input by pressing a pen, etc., against this touch panel. With this operation, coordinate signals that correspond to, for example, the beginning and end of the area specified by the user can be obtained as area-specifying signals from the touch panel. Area-specifying section (508) can set a plurality of areas within the same image, and it can also set these areas so that part or all of one area overlaps other areas.

[0125]

The area-specifying signals that are output from area-specifying section (508) are input to important-area-address memory (509). This important-area-address memory (509) stores the read addresses corresponding to the area-specifying signals from area-specifying section (508), and, from then on, when the stored read address is output from address control section (502), it transmits a control signal to either filter control section (506) or to quantizing-width control section (507) or to both sections. This control signal causes space-time filter (503) to

set the filtering degree of the low-pass filter smaller and causes quantizing-width-control section (506) to set the quantizing width at coding section (507) smaller.

[0126]

Supposing that, as shown in Fig. 45 (a), important area (601), which the user wants to see in detail, is specified in the decoded image at the receiving end or in the picked-up image or locally decoded image at the transmitting end (hereinafter referred to as image (600)), within this important area (601), the quantizing width becomes smaller than in the other areas, or the filtering degree of the low-pass filter becomes smaller, thereby improving the image quality of important area (601) compared to that of the other areas.

[0127]

If, as shown in Fig. 45 (b), a plurality of important areas (601 and 602) are specified at different positions of image (600), because these areas (601 and 602) do not overlap, they are treated in the same way by quantizing-width control section (507) or filtering-degree control section (506). As a consequence, in these areas (601 and 602), the quantizing width becomes smaller than in the other areas, or the filtering degree of the low-pass filter becomes smaller, thereby improving the image quality of important areas (601 and 602) compared to other areas.

[0128]

Supposing that, as shown in Fig. 45 (c), in addition to important areas (601 and 602), area (603) is specified within

image (600) and that area (603) is included in area (601), quantizing-width control section (507) and filtering-degree control section (506) consider area (603) more important than areas (601) and (602). In this case, the quantizing width in areas (601 and 602) becomes smaller than other areas except area (603), or the filtering degree of the low-pass filter becomes smaller, thereby improving the image quality of important areas (601 and 602), and, in respect to area (603), the quantizing width becomes further smaller than in areas (601 and 602), or the filtering degree of the low-pass filter becomes further smaller, thereby improving the image quality of important area (603) more than that of important areas (601 and 602). If the specification of area (603) is canceled in Fig. 45 (c), the condition returns to the condition shown in Fig. 45 (b). /13

[0129]

Thus, the present working example makes it possible to specify a plurality of important areas on an image, and, when these areas overlap, this example considers the overlapping areas more important than the areas that do not overlap and improves the image quality accordingly.

[0130] [Effects of the Invention]

As is explained in the foregoing, the present invention has the following effects.

[0131]

(1) Because the first invention places the image-display means below the user's view at the upper body of the user, both

the user's hands are free, and the videophone can be used without the main body's obstructing the user's view.

[0132]

By picking up the image from the image-reflecting means that is provided on the front of the image-display means or provided at a position adjacent to the image-display means, the distance from the image-pickup means and the face can be extended substantially, almost twofold ; therefore, the range of image pickup can be expanded using a camera with the same viewing angle.

[0133]

(2) The second invention uses the means of supporting the portable-videophone main body for adjusting the length from the bottommost portion of the main body to the image-pickup means, thereby making it possible to expose the image-pickup means from a breast pocket in order to pick up images.

[0134]

By exposing the image-pickup means even when the main body is folded, the process of image pickup can be conducted while the display means is protected. Furthermore, when the image is flipped from top to bottom due to the folding or inverting of the main body, the video information is inverted and picked up, thereby making it possible to pick up images in a correct top/bottom relationship.

[0135]

(3) The third invention makes it possible to adjust, easily and appropriately, the scaling, etc., of a picked-up image while displaying the picked-up image on part or all of the image-display section. By switching and setting the function assignment of the operating means in two ways, for right-hand use and left-hand use, the videophone can be operated with ease by both right-handed people and left-handed people. In addition, because the operating means are placed on the sides of the main body, the user can easily operate them with a finger tip while holding the main body.

[0136]

(4) Regarding the fourth invention, while the videophone is supported in a standing position on a desk, etc., the operating means can be removed from the portable-videophone main body and used; therefore, the image of the user's face can be picked up and transmitted correctly, and it also becomes possible to avoid knocking over the main body and shaking the picked-up image by pushing the operating buttons on the main body.

[0137]

(5) The fifth invention suspends part of the image-display means or changes the display mode when the charge level of the means for storing electricity drops below a given value, thereby limiting power consumption and making it possible to continue minimum-level communication by voice for a long period of time.

(6) The sixth invention has the image-display means and image-pickup means provided on the operation panel, thereby protecting these means and also making it possible to use the transmission/ reception device of the main body by placing it against the ear like a prior portable voice telephone for voice-only calls, like a prior portable voice telephone.

[0138]

(7) Regarding the seventh invention, the antenna and at least part of the structural components of the image-display means, image-pickup means, and connecting means comprise a space diversity antenna, thereby improving the degree of freedom of the antenna arrangement that is required for implementing space diversity.

[0139]

By imparting the freedom of rotation, expansion, etc., to the connecting means, this portable videophone has an advantage in that the positioning of the image-display means and the image-pickup means becomes easy.

[0140]

Regarding the eighth invention, when a plurality of important areas are specified on an image in an overlapping manner, the especially important video information of an area that is overlapped can be coded, transmitted, and displayed in higher quality than the video information of other important areas.

[Brief Explanation of the Drawings]

[Figure 1] A perspective view that illustrates the configuration of the portable videophone pertaining to Working Example 1.

[Figure 2] A side view that illustrates an application mode of the portable videophone pertaining to Working Example 1.

[Figure 3] A side view that illustrates another application mode of the portable videophone pertaining to Working Example 1.

[Figure 4] A perspective view that illustrates the configuration of the essential parts of the portable videophone pertaining to Working Example 2.

[Figure 5] A drawing that is a schematic presentation of the portable videophone pertaining to Working Example 3.

[Figure 6] A perspective view that shows the configuration of a prior portable videophone.

[Figure 7] A perspective view that shows the configuration of the portable videophone pertaining to Working Example 4.

[Figure 8] A perspective view of the portable videophone pertaining to Working Example 4 in the folded condition.

[Figure 9] A perspective view that illustrates an application mode of the portable videophone pertaining to Working Example 4.

[Figure 10] A perspective view that shows the portable videophone pertaining to Working Example 4 in the folded condition.

[Figure 11] A block diagram that shows the configuration of the signal processing system of the portable videophone pertaining to Working Example 4.

[Figure 12] A perspective view that schematically illustrates the configuration of the portable videophone pertaining to Working Example 5.

[Figure 13] A cross-sectional view that shows the internal structure of the portable videophone pertaining to Working Example 5. /1

[Figure 14] A front view of the portable videophone pertaining to Working Example 6.

[Figure 15] A perspective view of the portable videophone pertaining to Working Example 6.

[Figure 16] Drawings that illustrates example images displayed on the display in Working Example 6.

[Figure 17] A perspective view that shows a condition in which the operation panel of the portable videophone pertaining to Working Example 6 is removed.

[Figure 18] A front view that shows a condition in which the display of images by the portable videophone pertaining to Working Example 7 has been suspended.

[Figure 19] A block diagram of the portable videophone pertaining to Working Example 7.

[Figure 20] A flow chart of the process of monitoring the power-consumption level in Working Example 8.

[Figure 21] A flow chart of the process of monitoring the power-consumption level in Working Example 9.

[Figure 22] A flow chart of the process of monitoring the power-consumption level in Working Example 10.

[Figure 23] A flow chart of the process of monitoring the power-consumption level in Working Example 11.

[Figure 24] A flow chart of the process of monitoring the power-consumption level in Working Example 12.

[Figure 25] A flow chart of the process of monitoring the power-consumption level in Working Example 13.

[Figure 26] A drawing that shows an example display-area division on the display in Working Example 10.

[Figure 27] A block diagram that shows the configuration of the portable videophone pertaining to Working Example 14.

[Figure 28] A front view that shows the configuration of the portable videophone pertaining to Working Example 14.

[Figure 29] A front view that shows a condition in which the operation panel of the portable videophone pertaining to Working Example 14 is open.

[Figure 30] A perspective view that illustrates an example application mode of the portable videophone pertaining to Working Example 14.

[Figure 31] A front view that illustrates an example application mode of the portable videophone pertaining to Working Example 14.

[Figure 32] A drawing that illustrates an example application mode of the portable videophone pertaining to Working Example 14.

[Figure 33] A drawing that illustrates an example application mode of the portable videophone pertaining to Working Example 14.

[Figure 34] A drawing that illustrates an example application mode of the portable videophone pertaining to Working Example 14.

[Figure 35] A perspective view that shows the configuration of the portable videophone pertaining to Working Example 15.

[Figure 36] A front view that shows the configuration of the portable videophone pertaining to Working Example 16.

[Figure 37] A front view that shows the configuration of the portable videophone pertaining to Working Example 17.

[Figure 38] A front view and a side view that illustrate the configuration of the portable videophone pertaining to Working Example 18.

[Figure 39] A front view and a side view that illustrate the configuration of the portable videophone pertaining to Working Example 19.

[Figure 40] A drawing that illustrates the configuration of the portable videophone pertaining to Working Example 20.

[Figure 41]. A drawing that illustrates the configuration of the portable videophone pertaining to Working Example 21.

[Figure 42] A side view that illustrates the configuration of the portable videophone pertaining to Working Example 22.

[Figure 43] A side view that illustrates the configuration of the portable videophone pertaining to Working Example 23.

[Figure 44] A block diagram that illustrates the configuration of the portable videophone pertaining to Working Example 24.

[Figure 45] Drawings for explaining the operation of the portable videophone pertaining to Working Example 24, said drawings showing important areas on the image.

[Explanation of the Key]

201... supporting member; 202... display; 203... camera; 204... earphone; 205... case; 206... image-reflecting surface; 207... image-reflector; 220... base; 221... display; 222... camera; 223... lid; 224 ... stand; 225 ... hook; 226... top/bottom flipping circuit; 227... switch; 228... lid open/close detection circuit; 229... top/bottom flipping detector; 230... EXOR circuit; 233... lens; 234... image-pickup device; 235... image-pickup signal; 236... encoder; 237... enclosure; 238... belt; 239... motor; 301... display screen; 302... camera; 303... right-hand-use scaling-adjustment knob; 304... left-hand-use scaling-adjustment knob; 305... telephone-number specifying panel; 306... microphone; 307... speaker; 308... antenna; 309... setup button; 310... power switch; 311... leg; 312... signal wire; 313... display screen; 314... adjusting section; 315... camera; 316... analog-to-digital

converter; 317... pre-processing section; 318... coding
section; 319... multiplexer; 320... display; 321... digital-to-
analog converter; 322... post-processing section; 323... decoding
section; 324... battery; 325... weak-battery detection section;
326... voice coding section; 327... microphone; 328... speaker;
100a; 100b... antenna; 101... antenna switching/ synthesizing
circuit; 102... decoder; 103... encoder; 104... display switching
device; 105... speaker; 106... display; 107... camera; 108...
microphone; 109... control circuit; 111... first
transmission/reception antenna; 112... speaker; 113... operation
panel; 114... supporting member; 115... microphone; 116...
camera; 117... display panel; 118... user; 119... cable; 121...
antenna; 122... antenna; 131... operation panel; 132... panel;
141... operation panel; 142... panel; 151... operation panel;
152... panel; 161... operation panel; 162... panel; 410...
portable-videophone main body; 411... tripod; 412... mounting
piece; 413... orientation-changing piece; 414... mounting piece;
415... antenna; 420... storage; 421... securing device; 430...
accordion-shape piece; 431... suction cup; 432... glass plate or
wall; 433... antenna; 440... hook storage; 441... hook; 442...
clamp; 442[sic] ... wall.

[Fig. 11]
Key: a) to encoder.

[Fig. 20]
Key: S1... initiates a call; S2... a given level of power remaining?; S3... charge-level warning; S4... A: continues the call with no change; B: voice-only call; C: terminates the call; S5... turns the display off; S6... indicates remaining charge; S7... continue the call?; S8... terminates the call.

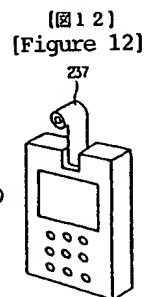
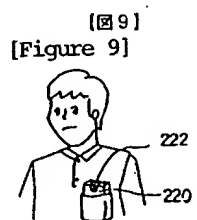
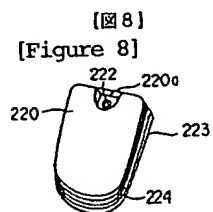
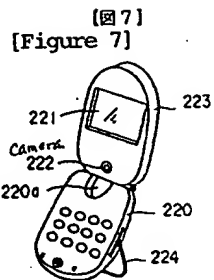
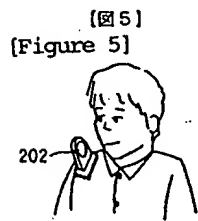
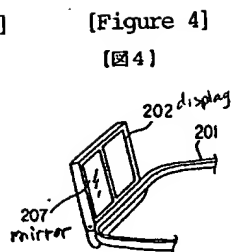
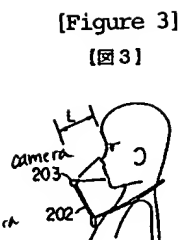
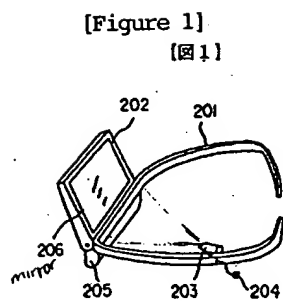
[Figure 21]
Key: S1... initiates a call; S2... a given level of power remaining?; S3... charge-level warning; S4... A: continues the call with no change; B: voice-only call; C: terminates the call; S6... indicates remaining charge; S7... continue the call?; S8... terminates the call; S9... part of the display off.

[Figure 22]
Key: S1... initiates a call; S2... a given level of power remaining?; S3... charge-level warning; S4... A: continues the call with no change; B: voice-only call; C: terminates the call; S6... indicates remaining charge; S7... continue the call?; S8... terminates the call; S10... scales down the image size; part of the display off.

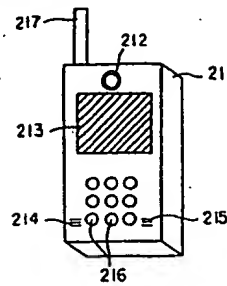
[Figure 23]
Key: S1... initiates a call; S2... a given level of power remaining?; S3... charge-level warning; S6... indicates remaining charge; S7... continue the call?; S8... terminates the call; S10... scales down the image size; part of the display off; S11... A: continues the call with no change; B: voice-only call; C: terminates the call; D: conservation-mode call; S12... part or all of the display off.

[Figure 24]/[Figure 25]
Key: S1... initiates a call; S2... a given level of power remaining?; S3... charge-level warning; S4... A: continues the call with no change; C: terminates the call; D: conservation-mode call; S6... indicates remaining charge; S7... continue the call?; S8... terminates the call; S13... changes the brightness of the display; S14... inputs a call mode (set in advance); S15... sets the call mode.

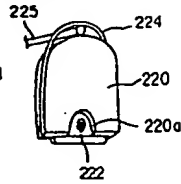
[Figure 44]
Key: 501... frame memory; 502... address control section; 503... space-time filter; 504... coding section; 506... filter-degree control section; 507... quantizing-width control section; 508... area- specifying section; 509... important-area address memory.



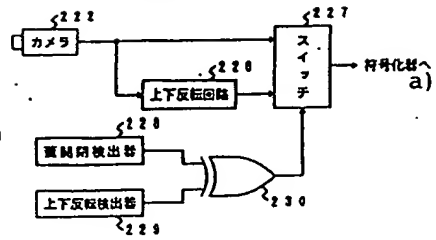
[Figure 6] (図6)



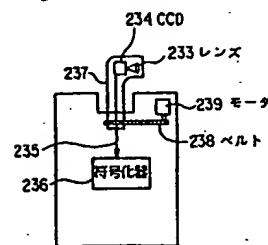
[Figure 10] (図10)



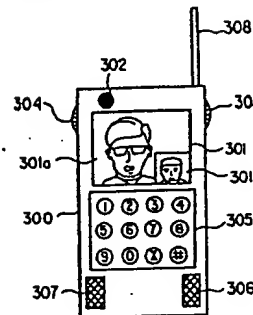
[Figure 11] (図11)



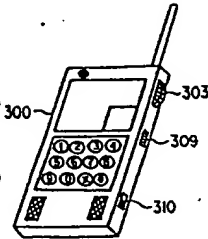
[Figure 13] (図13)



[Figure 14] (図14)



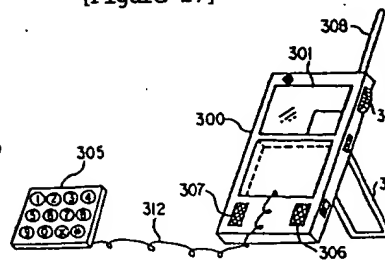
[Figure 15] (図15)



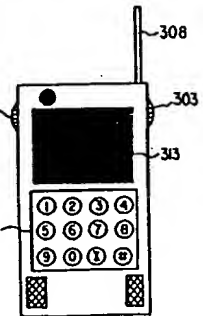
[Figure 16] (図16)



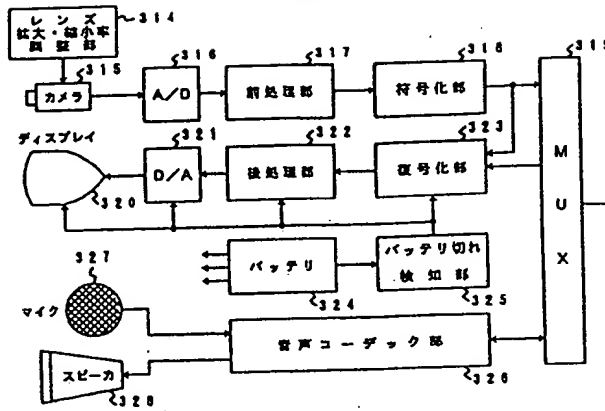
[Figure 17] (図17)



[Figure 18] (図18)



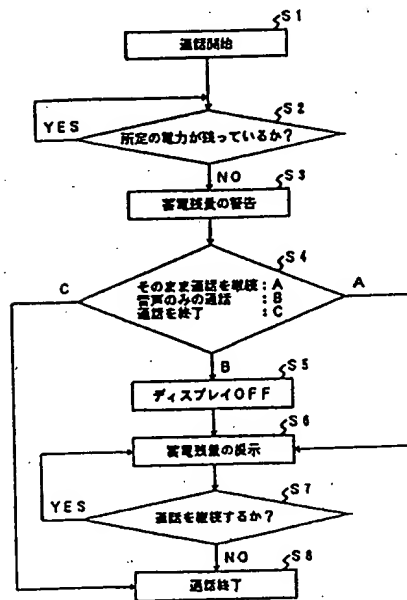
【図19】
[Figure 19]



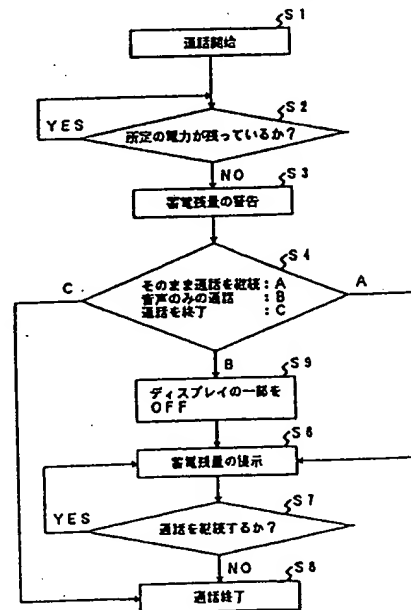
【図26】 [Figure 26]

a	b	c
d	e	f
g	h	i

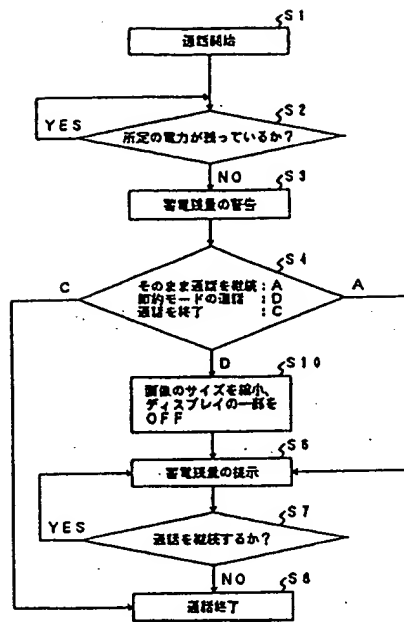
【図20】 [Figure 20]



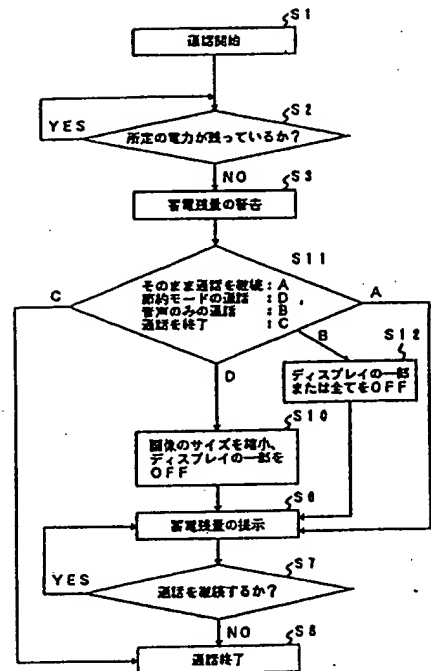
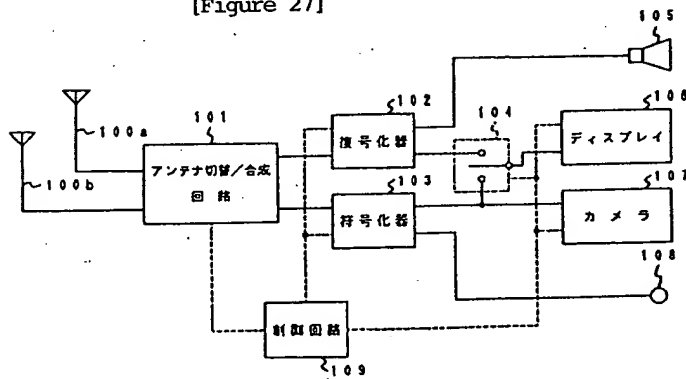
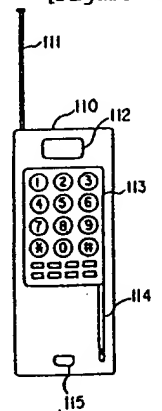
【図21】 [Figure 21]



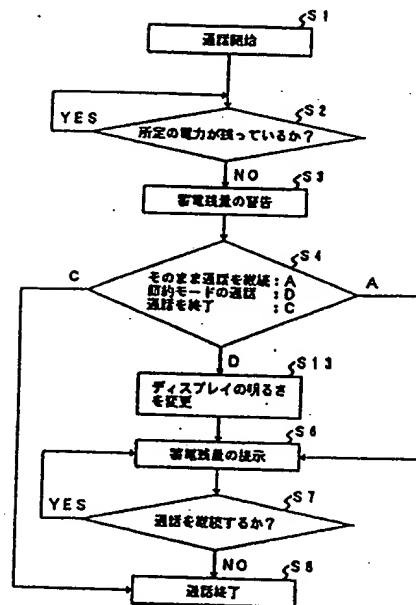
〔図22〕 [Figure 22]



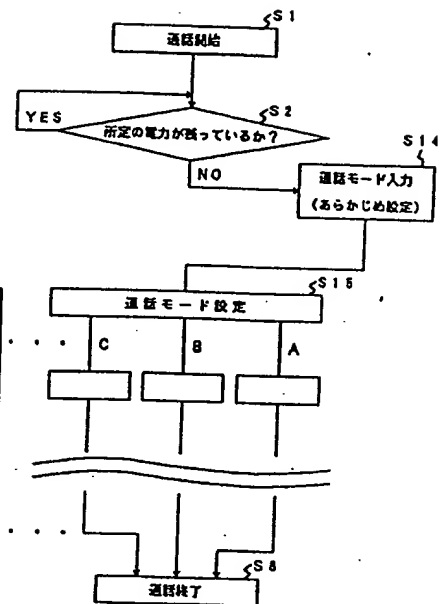
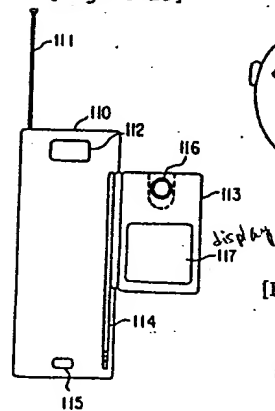
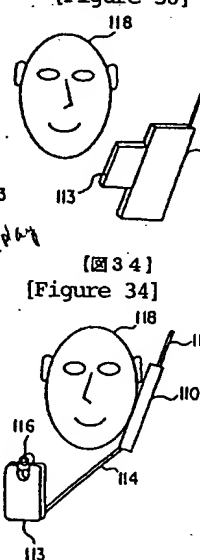
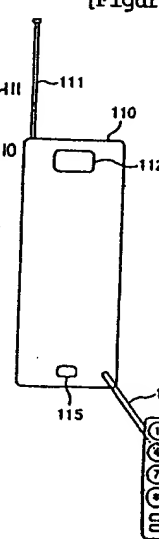
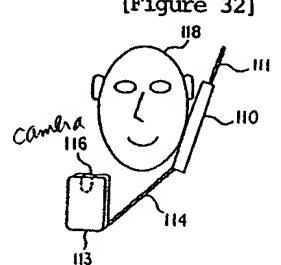
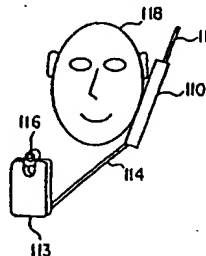
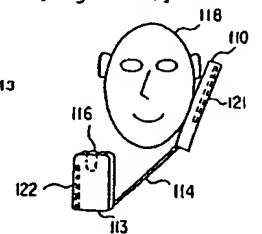
〔図23〕 [Figure 23]

〔図27〕
[Figure 27]〔図28〕
[Figure 28]

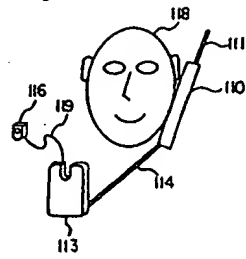
【図24】 [Figure 24]



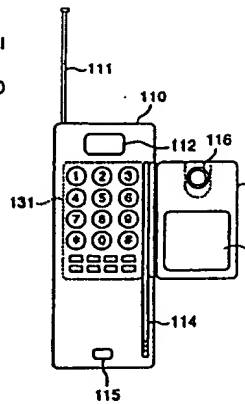
【図25】 [Figure 25]

【図29】
[Figure 29]【図30】
[Figure 30]【図31】
[Figure 31]【図32】
[Figure 32]【図34】
[Figure 34]【図35】
[Figure 35]

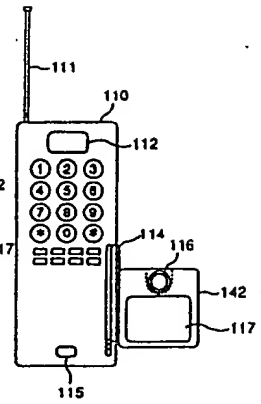
【図33】
[Figure 33]



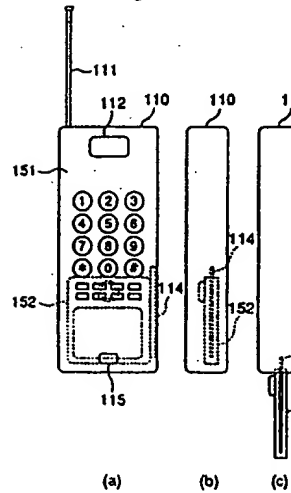
【図36】
[Figure 36]



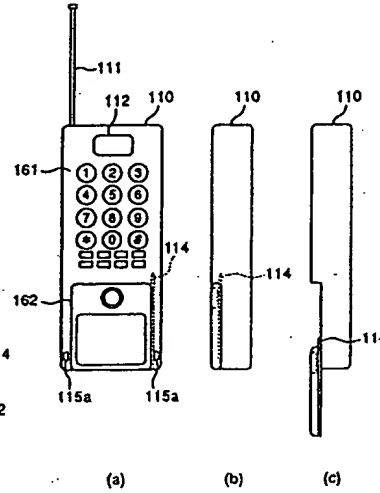
【図37】
[Figure 37]



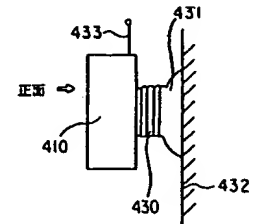
【図38】
[Figure 38]



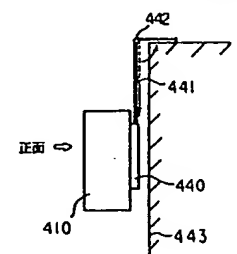
【図39】
[Figure 39]



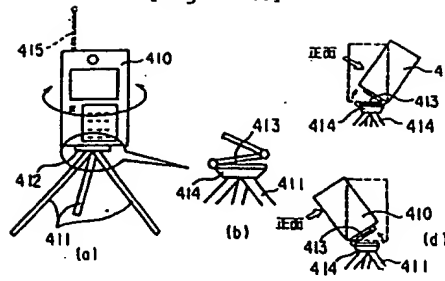
【図42】
[Figure 42]



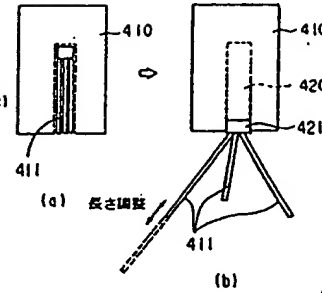
【図43】
[Figure 43]



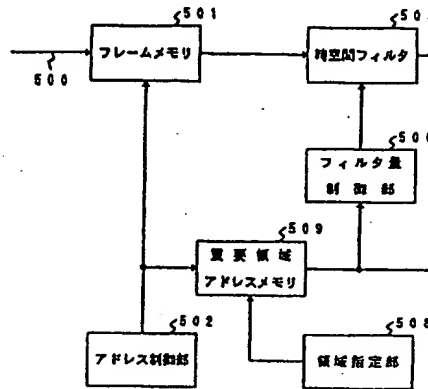
【図40】
[Figure 40]



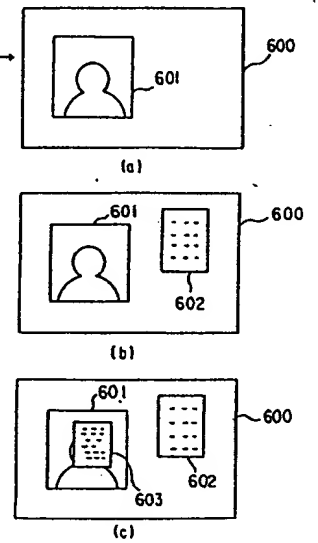
【図41】 [Figure 41]



【図44】[Figure 44]



【図45】 [Figure 45]



20
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01/14/97

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GROUP ART UNIT

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APPLICANT

EDWARD T. BULLISTER, NEWTON, MA.

****CONTINUING DATA*****
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VERIFIED**

FOREIGN FILING LICENSE GRANTED 03/19/97

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CLAIMS

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CLAIMS

4

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